

OFFICE MEMORANDUM • STANFORD UNIVERSITY

DATE: July 8, 1959

TO : Self

FROM : J. E. H. - JPL

SUBJECT:

Session today in Biophysics conference room on decontamination tactics for space vehicles.

Present were:

Dunlap, from the Department of General Engineering, General Electric Corporation, Schenectady, New York

Bauman,

Davies, from JPL

Derbyshire, from NAS

Phillips, from Fort Detrick

and myself

1. Quartermaster Corps has planned for large radiation facility at Stockton; G. E. can do this at Vallecitos.
2. Back contamination problem should eventually be referred to WHO.
3. Classification of contamination into (a) pollution. (b) infection. Pollution can be either viable or sterilized. Pollution not serious if highly localized. Bauman seemed to think that most impacts would be localized.
4. Considerable discussion about handling for cleanliness; Bauman was not too sure how this might be done for internal parts although, of course, the polished surfaces are very carefully wiped. He did not know the nature of the resin used potting compound. Replicate copies are kept of various missiles although not a great deal of caution is taken to see that they are exact replicas with identical lot numbers on various equipment.
5. Detrick had not been very successful in finding residual self-sterilizing oils although obviously solutions of ethylene oxide in oils would be momentarily disinfectant. I did not get the impression that they have done very much investigation of the epoxides of higher molecular weight.

## OFFICE MEMORANDUM • STANFORD UNIVERSITY

DATE:

To :

FROM : LEDERBERG - GALLIES

SUBJECT: Decontamination Meeting

6. We do not know how to evaluate the possibility that high vacuum by itself may be lethal owing to the distillation of fats. There is little information on the extreme vacuums that have been tested and certainly nothing that compares to availability in space. More pressure should be put on this for a satellite experiment. Most of the discussion did center on the properties of ethylene oxide and it was perfectly obvious that this would be the agent of choice. This has a high degree of reactivity and penetration and when used as a 10 per cent gas in a diluent like  $\text{CO}_2$  or freon is quite safe from the point of view of inflammability. However, under these conditions, drastic sterilization may take something like 10 hours at one atmosphere pressure. Phillips quoted a figure of 2,000 milligram hours per liter as a reasonable dose level for "complete" sterilization. He felt that any consideration of manned vehicles should also include the problems of microbe barriers both for the investigation of the planet and for the return of the vehicle. He also demonstrated the type of equipment in which sterilization is possible for example, a freon-ethylene-oxide-aerosol bomb which can be pierced and opened inside of a large polyethylene bag. He seems to feel that the elaborate equipment of the sort used in hospitals is quite unnecessary for ethylene oxide sterilization. He pointed out that ethylene oxide is highly soluble in many plastics and there may be considerable residual bactericidal activity after the ethylene oxide has removed and some caution should be taken about this. The main conclusion of the discussion, and there was just no question about this, was that very strong support should be given to the assignment of technical direction for decontamination procedures to the Chemical Corps Laboratories at Fort Detrick. These will include, in the first instance, microbiological studies of the existent parts as they go into the rockets, how effective ethylene oxide sterilization is on the components and the determination of the residual microbial

OFFICE MEMORANDUM • STANFORD UNIVERSITY

DATE:

To :

FROM : LEDERBERG - GENETICS

SUBJECT: Page 3

Decontamination Meeting

flora after surface sterilization is done on sealed components such as condensers and transistors. Then these components can be studied part by part to determine the most effective method of sterilization each of them. For spot purposes, it may be important to use techniques such as thermal and radiation sterilization. On the whole, the assembly including the last rocket stage is simply too large for easy handling by radiation sterilization and there might be considerable question as to the lability of electronic parts. However, for sealed components this may prove to be a very important method. Derbyshire agreed to write up the proceedings of this particular meeting for circulation and action by the Space Science Board. It was understood that this particular session was not concerned with the objectives of sterilization so much as the tactics of achieving this. However, it was necessary to spend about half the time of the session in general discussion of these objectives in order to get a reasonable orientation.

7. Dick Davies will be in London at the Astronautics Congress until September 8th and would prefer that Westex be held after that time. He is giving a paper on the decontamination question at the Congress.
8. A memorandum should be circulated to Westex during the next week or two reporting this meeting, the developments on the Space Science Board, and the BioAstronautics affiliation and also calling for the comments on the position paper.
9. (Recall that Pollock had suggested Gause as a useful contact in Moscow. Unfortunately, he was in London until fairly recently but it will not be feasible for the moment to make contact with him.
10. Derbyshire suggested setting up a Stanford account for Space Board expenses.

End.